



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4  
ATLANTA FEDERAL CENTER  
81 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8580

MAR 04 2003

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

4WD-FFB

Commanding Officer  
Naval Air Station Pensacola  
190 Radford Boulevard  
Pensacola, Florida 32508-5217

SUBJ: Five Year Review  
Naval Air Station Pensacola  
Pensacola, Florida

Dear Sir:

The U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the above subject decision document and concurs that the remedy remains protective of human health and the environment for Operable Unit 10 (OU10) and is not protective for Operable Unit 1 (OU1). The remedies are supported by the previously completed Remedial Investigation, Feasibility Study and Baseline Risk Assessment Reports. They are also supported by the review of the current applicable or relevant and appropriate requirements (ARARs). However, the remedy for OUI requires additional work.

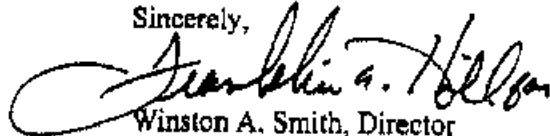
Discussions and recommendations are included in the text highlighting deficiencies and corrective actions. EPA concurs with the recommendations and follow up actions identified. The actions include an evaluation/optimization of the treatment system and natural attenuation augmentation for OU1. These recommendations will undergo further review by my staff and will be documented by other reporting mechanisms. EPA will work closely with NAS Pensacola to implement these recommendations and corrective actions, as necessary.

10054870



EPA appreciates the coordination efforts of NAS Pensacola and the level of effort that was put forth in developing this "Five Year Review" report. EPA looks forward to continuing the exemplary working relationship with NAS Pensacola and Southern Division Naval Facilities Engineering Command as we move toward final cleanup of the NPL site.

Sincerely,



Winston A. Smith, Director  
Waste Management Division

cc: Greg Campbell, NAS Pensacola  
William Hill, SOUTHDIV  
Tracie Vaught, FDEP

TtNUS/TAL-03-10-4196/3.2

February 7, 2003

Project Number N4196

U.S. Environmental Protection Agency  
ATTN: Gena Townsend  
Environmental Engineer  
61 Forsyth Street, SW  
Atlanta, GA 30303-3104

Reference: Clean Contract Number N62467-94-D-0888  
Contract Task Order Number 0229

**Subject: Final Five-Year Review  
Naval Air Station Pensacola  
Pensacola, Florida**

Dear Ms. Townsend:

Tetra Tech NUS, Inc. (TtNUS) is pleased to present the Final Five-Year Review for Naval Air Station Pensacola.

If you have any questions regarding the enclosed material, or if I can be of assistance in any way, please contact me at (850) 385-9899.

Very truly yours,

Gerald Walker, P.G.  
Task Order Manager

Enclosures

cc: Ms. Allison Harris, EnSafe (2)  
Ms. Tracie Vaught, FDEP  
Mr. Bill Hill, SOUTHNAVFACENGCOM (2)  
Mr. Greg Campbell, NAS Pensacola (2)  
Mr. Greg Wilfey, CH2M HILL  
Mr. Mark Perry, TtNUS (1 unbound copy)  
Ms. Debbie Wroblewski, TtNUS (cover letter only)  
File

4196030

# **Final Five-Year Review**

**Naval Air Station Pensacola  
Pensacola, Florida**



**Southern Division  
Naval Facilities Engineering Command  
Contract Number N62467-94-D-0888  
Contract Task Order 0229**

**February 2003**



Five-Year Review  
Naval Air Station Pensacola, Pensacola, Florida

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Naval Air Station Pensacola, Pensacola, Florida

CTO 0128  
Rev. 2  
Feb. 2003  
SOUTH DIV

CTO 0128  
Rev. 2  
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SOUTH DIV

CTO 0128  
Rev. 2  
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CTO 0228  
Rev. 2  
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SOUTH DIV

CTO 0228  
Rev. 2  
Feb. 2003  
SOUTH DIV

**FIVE YEAR REVIEW**

**NAVAL AIR STATION PENSACOLA  
PENSACOLA, FLORIDA**

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:  
Southern Division  
Naval Facilities Engineering Command  
2155 Eagle Drive  
North Charleston, South Carolina 29406**

**Submitted by:  
Tetra Tech NUS, Inc.  
661 Andersen Drive  
Foster Plaza 7  
Pittsburgh, Pennsylvania 15220**

**CONTRACT NUMBER N62467-94-D-0888  
CONTRACT TASK ORDER 0229**

**February 2003**

**PREPARED UNDER THE SUPERVISION OF:**



**GERALD WALKER  
TASK ORDER MANAGER  
TETRA TECH NUS, INC.  
TALLAHASSEE, FLORIDA**

**APPROVED FOR SUBMITTAL BY:**



**DEBBIE WROBLEWSKI  
PROGRAM MANAGER  
TETRA TECH NUS, INC.  
PITTSBURGH, PENNSYLVANIA**

**Key Review Information**

Site Identification		
Site Name: Naval Air Station Pensacola		EPA ID: FL9 170 024 567
Region: 4	State: FL	City/County: Pensacola/Escambia
Site Status		
NPL Status: Final		
Remediation Status (under construction, operating, complete): OU1 – operating; OU10 – operating		
Multiple OU's* (highlight): <input checked="" type="checkbox"/> N		Number of OU's: 2 (for this review)
Construction Completion Date: OU1 – June 12, 1999; OU10 – November 12, 1997		
Fund/PRP/Federal Facility Lead: Federal Facility		Lead Agency: Department of the Navy, Southern Division Naval Facilities Engineering Command
Has site been put into reuse? (highlight): <input checked="" type="checkbox"/> N		
Review Status		
Who conducted the review (EPA Region, State, Federal Agency): Southern Division, Naval Facilities Engineering Command		
Author Name: Bill Hill		Author Title: Remedial Project Manager
Author Affiliation: Department of the Navy, Southern Division Naval Facilities Engineering Command		
Review Period: July 2002 to November 2002		Date(s) of Site Inspection: August 8, 2002
Type of Review: Statutory	Policy Type (name): 1. Post-SARA	Review Number (1, 2, etc.) 1
Triggering Action Event: OU10 Remedial Action (Soil Removal)		
Trigger Action Date: November 3, 1997		
Due Date: November 3, 2002		

\* OU refers to Operable Unit

**Issues:**

Deficiencies discovered during the five-year review were as follows:

**Recommendation and Follow-up Actions:**

Operable Unit 1

- Treatment system: evaluate system optimization and additional remedial options
- Natural Attenuation: investigate natural attenuation augmentation and additional remedial options
- Remove drums of IDW currently stored at the site
- Remove stored drums of IDW

Operable Unit 10

- ORC: effective treatment, but has a limited life cycle
- Institutional control: an institutional control for groundwater use is not included in the ROD.

**Protectiveness Statement(s):**

Operable Unit 1

The groundwater recovery and treatment system and natural attenuation remedies are not protective of human health and the environment.

Operable Unit 10

There is no institutional control limiting groundwater use to protect human health and the environment.

Signature of U.S. Department of the Navy and Date

*David A. Muthian, Captain, ORC, USN*  
*Assistant Chief of Staff for Environmental & Facilities*  
*Commanding Officer, NAS Pensacola, FL*

Captain, U. S. Navy

Commanding Officer

NAS Pensacola

*3 February 2003*  
Date



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## ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
ARAR	Applicable or Relevant and Appropriate Requirement
BEI	Bechtel Environmental, Inc.
b/s	Below Land Surface
CAP	Corrective Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	Contaminants of Concern
CNET	Chief of Naval Education and Training
CTO	Contract Task Order
CTLs	Contaminant Clean-up Target Levels
DoD	Department of Defense
GCTL	Groundwater Cleanup Target Level
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDER	Florida Department of Environmental Regulation
FFA	Federal Facilities Agreement
FS	Focused Feasibility Study
IAS	Initial Assessment Study
IR	Installation Restoration
ISDB	Industrial Sludge Drying Bed
IWTP	Industrial Waste Treatment Plant
LTGMP	Long-term Groundwater Monitoring Plan
LUCIP	Land Use Control Implementation Program
LURA	Land Use Restriction Agreement
MCL	Maximum Contaminant Levels
MCLG	Maximum Contaminant Level Goals
MNA	Monitored Natural Attenuation
MOA	Memorandum of Agreement
NAS	Naval Air Station
Navy	United States Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System

NPL	National Priorities List
O&M	Operation and Maintenance
ORC	Oxygen Releasing Compound
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PSC	Potential Source of Contamination
PWC	Public Works Center
RAB	Remedial Advisory Board
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SOUTHNAVFACENGCOM	Southern Division Naval Facilities Engineering Command
SVOCs	Semivolatile Organic Compounds
SPLP	Synthetic Precipitation Leaching Procedure
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
TINUS	Tetra Tech NUS, Inc.
µg/L	Micrograms per Liter
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds
WWTP	Wastewater Treatment Plant
yd <sup>3</sup>	Cubic Yards

## 1.0 INTRODUCTION

This five-year review has been prepared under Contract Task Order (CTO) 0229 as part of the Comprehensive Long-term Environmental Action Navy III (CLEAN) Contract Number N62467-94-D-0888 for the Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). Tetra Tech NUS, Inc. (TINUS) conducted the five-year review of OUs 1 (Site 1, Sanitary Landfill) and 10 (Sites 32, 33, and 35, Industrial Waste Treatment Plant [IWTP] Sludge Drying Beds, Wastewater Treatment Plant [WWTP] Ponds, and IWTP Solid Waste Management Units [SWMUs]) at NAS Pensacola, located in Northwest Florida on the west edge of Pensacola Bay, two miles south of Pensacola, Florida, on Navy Boulevard (Figure 1-1). The locations of the OUs are shown on Figure 1-2.

Five additional OUs (OU4, OU6, OU12, OU14, and OU17), have signed the RODs; however, RODs for four OUs (OU6, OU12, OU14, and OU17) concluded a No Further Action (NFA) at each site was appropriate. The NFA was based on no hazardous substances, pollutants, or contaminants from past storage, handling, and disposal practices remaining at the sites. Because of the NFA, the five-year review process does not apply. The ROD for OU4 did conclude that remedial actions were needed because hazardous substances, pollutants, or contaminants from past storage, handling, and disposal practices remained at the site. However, OU4 is not being included in this five-year review because the remedial action consisting of soil removal and groundwater monitoring has just begun. Therefore, there is no current data detailing the present site conditions. OU4 will be addressed in a subsequent five-year review.

The purpose of the five-year review is to determine whether the selected remedies at the OUs are protective of human health and the environment. The methods, findings, and conclusions of the reviews are documented in this Five-Year Review report. In addition, this report identifies issues found during the review, if any, and identifies recommendations to address them.

The United States Environmental Protection Agency (USEPA) is responsible for implementing statutory five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). However, by Executive Order 12580, federal facilities under the jurisdiction, custody, or control of the Department of Defense (DoD) relieves the USEPA of this responsibility and delegates the responsibility to the DoD. The United States Navy (Navy) is the lead agency responsible for this five-year review at NAS Pensacola, working with the USEPA and the Florida Department of Environmental Protection (FDEP) through the Federal Facilities Agreement (FFA).

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<p>FLORIDA Location</p>	<p>SOURCE: U.S. ARMY TOPOGRAPHIC COMMAND (TMG) MAP, PENSACOLA, FLA.; ALA 1967. PHOTOREVISED 1986. MINOR REVISION 1970.</p>	<p>0 8000 16000 SCALE IN FEET</p>
<p>DRAWN BY DATE DM 10/11/02 CHECKED BY DATE COST/SCHED-AREA SCALE AS NOTED</p>		<p>BASE LOCATION MAP FIVE YEAR REVIEW REPORT HAS PENSACOLA PENSACOLA, FLORIDA</p>
<p>CONTRACT NO. 4196 APPROVED BY DATE APPROVED BY DATE DRAWING NO. FIGURE 1-1 REV. 0</p>		



This is the first five-year review for the NAS Pensacola OUs. The triggering action for the statutory review was the mobilization to OU10 to complete the removal action. Mobilization occurred on November 3, 1997. This five-year review is being conducted because hazardous substances, pollutants, and contaminants from past storage, handling, and disposal practices remain at OU1 and OU10 above levels that allow for unlimited use and unrestricted exposure at NAS Pensacola.

This report consists of five sections as listed below:

- Section 1.0 discusses the purpose of the report, provides a summary of the history and site chronology of NAS Pensacola, and evaluates the changes that have occurred in the Applicable or Relevant and Appropriate Requirements (ARARs).
- Sections 2.0 and 3.0 are the five-year reviews for OUs 1 and 10, respectively at NAS Pensacola. Each section includes the OU chronology, background, summary of the remedial actions performed and the five-year review process, technical assessment, issues, recommendations and follow-up actions, and protectiveness statements.
- Section 4.0 provides a general summary, conclusions, and protectiveness statement for the NAS Pensacola facility. This section also identifies when the next five-year review is required and the other tasks that should be performed as part of that five-year review.

TtNUS conducted the five-year review in conjunction with the NAS Pensacola Partnering Team, which includes:

- Bill Hill, SOUTHNAVFACENGCOM
- Greg Campbell, NAS Pensacola
- Gena Townsend, USEPA
- Tracie Vaught, FDEP
- Brian Caldwell, EnSafe
- Allison Harris, EnSafe
- Gerry Walker, TtNUS
- Greg Wilfley, CH2M HILL

This five-year review consisted of a review of relevant documents, interviews, and a site inspection. In addition, a presentation was made to the NAS Pensacola Remedial Advisory Board (RAB), and an announcement (included as Appendix A) of the review was provided to the public prior to the completion of the review. The completed report is available in the information repository at the John C. Pace Library, located at the University of West Florida, Pensacola, Florida, and at NAS Pensacola, Building 633.



## **1.1 OVERVIEW OF NAS PENSACOLA**

The official mission of NAS Pensacola is to provide facilities, service, and support for the operation and maintenance of naval weapons and aircraft to operating forces of the Navy as designated by the Chief of Naval Operations. Some of the tasks required to accomplish this mission include operation of fuel storage facilities, performance of aircraft maintenance, maintenance and operation of engine repair facilities and test cells for aircraft engines, and support of weapon systems. The following sections provide a history and chronology, as well as a brief description of the physical and geological conditions at NAS Pensacola.

## **1.2 HISTORY**

The U.S. Navy has maintained a presence in the Pensacola area since 1825, when a Navy Yard was established on Pensacola Bay. Between 1828 and 1835, the Navy acquired approximately 2,300 acres as operations expanded. Several natural disasters in the early 1900s destroyed the yard and forced it into maintenance status in 1911. Three years later the Navy's first permanent air station was established on the site of the old Navy yard. The air station has been the primary training base for naval aviators since that time and continues to expand (EnSafe, 1996).

Today, NAS Pensacola occupies 5,800 acres on a peninsula in southern Escambia County, five miles southwest of the City of Pensacola. The peninsula is bounded on the north by Bayou Grande and on the east and south by Pensacola Bay. Various housing, training, and support facilities are on the base. A large naval aviation depot that repairs and refurbishes aircraft engines and frames was in the area surrounding Chevalier Field. Most industrial operations were conducted in the older portion of the base, on the eastern end of the peninsula. The naval aviation depot was decommissioned in September 1995. The western end is taken up by the main airfield (Forrest Sherman Field) and undeveloped forest land (EnSafe, 1996).

The Navy initiated an environmental investigation of NAS Pensacola in 1983. Because of environmental investigation activities, 29 potential sources of contamination (PSCs) were identified as needing a additional investigation. In December 1989, the base was placed on the National Priorities List (NPL). The FFA, signed in October 1990, outlined the regulatory path to be followed at NAS Pensacola. NAS Pensacola must complete, not only the regulatory obligations associated with its NPL listing, but it also must satisfy the ongoing requirement of an environmental permit issued in 1988. A permit is an authorizing document issued by an approved Florida agency or USEPA to implement the requirements of an environmental regulation. That permit addresses the treatment, storage, disposal of hazardous waste, and the investigation and remediation of any releases of hazardous waste and/or constituents from SWMUs at NAS Pensacola. The Resource Conservation and Recovery Act (RCRA) governs ongoing use of

hazardous wastes and the operating permit rules. RCRA and the CERCLA investigations and actions are coordinated through the FFA, streamlining the cleanup process. Currently, the cleanup program is being conducted under the Navy's Installation Restoration (IR) program.

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## 2.0 OPERABLE UNIT 1, SITE 1, SANITARY LANDFILL

Implementation of the remedial actions at OU1 began in 1999. This five-year review consists of an approximate three-year period of data and provides a status update for OU1. This statutory review is required by regulation because landfill wastes are still contained on site and do not allow for unlimited use and unrestricted exposure.

### 2.1 SITE CHRONOLOGY

A list of important OU1 historical events and relevant dates in the site chronology is shown in Table 2-1.

<b>TABLE 2-1</b> <b>OU1 Site Chronology</b>  <b>Five-Year Review</b> <b>Naval Air Station Pensacola</b> <b>Pensacola, Florida</b>	
<b>Event</b>	<b>Date</b>
Domestic and Industrial wastes from NAS Pensacola and other outlying Navy facilities are disposed of at OU1	Prior to 1974
Discovery of landfill leachate discharge	1974
Monitoring wells installed to investigate the leachate discharge	1975
Landfill officially closed.	1976
Initial Assessment Study (IAS) – OU1 was recommended for further investigation due to the presence of metals in the leachate	1983
Verification Study – monitoring wells were installed to collect groundwater samples to confirm the IAS results	1984
Characterization Study – monitoring wells were installed to collect groundwater samples to determine the nature and extent of the contamination	1986
NAS Pensacola placed on NPL	1989
Contamination Assessment / Remedial Activities Investigation	1991
Final Remedial Investigation (RI) Report issued	January 5, 1996
Focused Feasibility Study issued	November 1997
Proposed Plan issued for Public Comment	December 1997
Final ROD issued	August 19, 1998
Conceptual Remedial Design issued	1998
Final Remedial Design issued	1999
Removal Action – 73 tons of material was removed	1998
Start of on-site construction of treatment system (Phase 1) (date that triggers the 5-year Review)	March 12, 1999

TABLE 2-1 (cont.) OU1 Site Chronology	
Event	Date
Memorandum of Agreement for Land Use Controls issued	March 31, 1999
Completion of on-site construction of treatment system	May 7, 1999
Treatment system testing, startup, and performance monitoring	June 1999
Long-term Groundwater Monitoring Plan issued	July 1999
Completion Report issued	March 2000
Operation and Maintenance (O&M) Manual for Groundwater Treatment and Recovery System issued	March 2000
O&M begins	March 2000

## 2.2 BACKGROUND

### 2.2.1 Site Description

Figure 1-2 is a generalized map of NAS Pensacola that shows the location of OU1 in the north-central portion of the facility. A detailed figure of OU1 is provided as Figure 2-1. Site 1 is an approximately 85-acre inactive sanitary landfill. It varies from 8 to 20 feet above mean sea level and is densely vegetated with 15- to 25-foot tall-planted pines and natural scrub vegetation. The landfill is bordered by an inland water body (Bayou Grande) to the north, by the A.C. Read Golf Course to the east, and by areas of natural scrub vegetation to the west and south. Bayou Grande has been classified by the FDEP as a Class III water body, indicating its use for recreation and maintaining a well-balanced fish and wildlife population. Beyond the scrub vegetation, Taylor Road lies approximately 200 feet south of the site.

### 2.2.2 Land and Resource Use

From the early 1950s until 1976, domestic and industrial wastes from NAS Pensacola and other outlying Navy facilities were disposed of at OU1. Wastes consisted of ketone-, poly-chlorinated biphenyl (PCB)-, and transformer oil- soaked rags; paint chips, paint sludge, compressed air cylinders, asbestos, and garbage. The facility was officially closed on October 1, 1976. (EnSafe, 1998a)

The land use for the areas immediately north of the landfill include a Boy Scout camp, a nature trail, an NAS Pensacola picnic area, and recreational Buildings 3553 and 3487. Also in this generally developed area are two tidal-inlet ponds with associated wetlands. Other wetland areas are west and east of the landfill; most are associated with marshy intermittent creeks. The nearest residential area (base housing)



is approximately 1,000 feet south of OU1. Potable water for this residential area and all NAS Pensacola is supplied from Cory Station, approximately three miles north of NAS Pensacola. Groundwater flow is generally northward, toward Bayou Grande and adjacent surface water features, with components to the northwest and northeast (EnSafe, 1998a).

### 2.2.3 History of Contamination

Landfill leachate discharging from an abandoned drainage field into a nearby golf course pond was discovered in 1974. Groundwater sample analysis detected phenol and several metals. Further investigations (Verification and Confirmation Studies) detected VOCs and trace concentrations of semivolatile organic compounds (SVOCs) in the groundwater. It was determined that contamination (VOCs, SVOCs, and metals) was limited to the areas within and around the landfill's perimeter. However, several metals were leaching to the shallow groundwater and migrating to the Wetland 3. Also, a tar pit was identified during the RI, which posed a physical hazard to site trespassers. (EnSafe, 1998a)

### 2.2.4 Initial Response

The physical hazard presented by the tar pit was initially addressed. Toxicity Characteristic Leaching Procedure (TCLP) samples collected from the tar pit in 1993, and indicated that the tar was not a hazardous waste. Therefore, a total of 73 tons of tar material was excavated in January 1996 and disposed of at a Subtitle D landfill to remove the physical hazard.

### 2.2.5 Basis for Taking Action

#### **Contaminants**

Hazardous substances that have been released at the site in each media include:

#### All Depth Soil

4-Chloro-3-Methylphenol  
Aluminum  
Barium  
Cadmium  
Copper  
Dieldrin  
Manganese  
2-Methylnaphthalene  
Naphthalene  
Nickel

#### Shallow and Intermediate Groundwater

1,1,2,2-Tetrachloroethane	Chromium
1,1,2-Trichloroethane	Copper
1,2-Dichloroethane (total)	Dieldrin
1,4-Dichlorobenzene	Manganese
Aluminum	2-Methylnaphthalene
Arsenic	Naphthalene
Barium	Nickel
Benzene	Trichloroethene
Bis(2-ethylhexyl)phthalate	Vinyl chloride
Bromoform	Xylene

**All Depth Soil (Continued)**

Tetrachloroethene

Toluene

Xylene

**Shallow and Intermediate Groundwater (Continued)**

Cadmium

Zinc

Chlorobenzene

Chloroform

**Surface Soil**

Aluminum

Aroclor-1248

Aroclor-1254

Aroclor-1260

Beryllium

Cadmium

Lead

Manganese

**Deep Groundwater**

Manganese

Exposure to all environmental media was within USEPA's generally acceptable ranges for the trespassing child and the potential future site worker. Exposure to the shallow/intermediate groundwater medium presented an unacceptable risk via the ingestion and inhalation exposure pathways for the hypothetical future site resident. Unacceptable risk was not projected for exposure to the surface soil or surface and subsurface soil. (EnSafe, 1998)

The primary non-carcinogenic chemicals of concern (COCs) for groundwater ingestion were arsenic, barium, cadmium, iron, manganese, nickel, and chlorobenzenes. The primary carcinogenic COCs identified for ingestion of groundwater included arsenic, vinyl chloride, and benzene. (EnSafe, 1998)

The primary non-carcinogenic COCs for inhalation of groundwater were benzene and chlorobenzene. No carcinogenic COCs were identified for the inhalation of groundwater exposure pathway. (EnSafe, 1998)

Surface water samples collected from Wetland 3 indicated iron was present in exceedance of the Florida contaminant clean-up target levels (CTLs). It was determined that iron was leaching into the shallow groundwater at OU1 and migrating to Wetland 3 (EnSafe, 1998a).



## 2.3 REMEDIAL ACTIONS

### 2.3.1 Remedy Selection

The ROD for NAS Pensacola OU1 was signed on August 19, 1998. Remedial Action Objectives (RAOs) were developed as a result of data collected during the RI to aid in the development and screening of remedial alternatives to be considered for the ROD.

The purpose of the remedial action at OU1 was to reduce the risks to human health and environment associated with exposure to contaminated groundwater and soil. To meet these goals, three RAOs were identified. Table 2-2 lists the RAOs for OU1.

<b>TABLE 2-2</b> <b>Remedial Action Objectives for OU1</b>  <b>Five-Year Review</b> <b>Naval Air Station Pensacola</b> <b>Pensacola, Florida</b>		
Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Groundwater	arsenic, barium, cadmium, iron, manganese, nickel, vinyl chloride, benzene, and chlorobenzene	Prevent current or future unacceptable exposure to contaminated groundwater
Surface Water	iron	Prevent further contamination of surface water
Waste		Protect groundwater from leaching compounds

Four remedial alternatives were evaluated in the Feasibility Study (FS) for OU1 to address the three RAOs. Of the four alternatives evaluated the selected remedial action for OU1 was Alternative 2c as listed in the ROD for OU1. The major components involved with Alternative 2c are listed below.

- Institutional controls imposed to restrict groundwater use of the surficial zone of the Sand and Gravel Aquifer within 300 feet of the site.
- Institutional controls imposed to limit intrusive activities within the landfill boundary without prior approval from the NAS Pensacola Environmental Office.
- Annual review of the institutional controls and certification that the controls should remain in place or be modified to reflect changing site conditions.
- Groundwater monitoring to ensure that the natural attenuation processes are effective.

- A review during which the Navy would determine whether groundwater performance standards continue to be appropriate and if natural attenuation processes are effective.
- Continued groundwater monitoring at regular sampling intervals after performance standards are attained. The groundwater monitoring program would continue until a five-year review concludes that the alternative has achieved continued attainment of the performance standards and remains protective of human health and the environment.
- A groundwater interception system to capture the contaminated groundwater upgradient of Wetland 3. The intercepted groundwater will be treated to reduce iron levels before being reintroduced into Wetland 3.
- Concentrations of the organic compounds present in the groundwater and surface water will be reduced through natural attenuation resulting from naturally occurring biotic and abiotic processes, which take place in the groundwater and surface water systems.

### **2.3.2 Remedy Implementation**

The remedial action was organized into two phases. The first phase included the design and construction of the treatment system. The second phase included the long-term groundwater monitoring plan. The remedial action selected for implementation at OU1 is consistent with CERCLA and the NCP. The selected remedy satisfies the statutory preference for treatment to the extent practicable, which permanently and significantly reduces the volume, mobility, and toxicity of hazardous substances as a principle element. The conceptual remedial design was completed by EnSafe for the Navy in 1998. The final remedial design was prepared by Bechtel Environmental, Inc. (BEI) and was included as a component of the *Remediation WorkPlan/Remedial Design for Phase I Groundwater Treatment and Recovery System at Operable Unit 1*. The remedial design included the specifications necessary to conduct Phase I (construction of treatment system) of the remedial actions listed in the ROD (EnSafe, 1998b).

Remedial activities began on April 12, 1999. BEI completed the installation of the interceptor trench/drain, pumping system, and the force main on May 7, 1999. The installation of electrical utilities, system startup, and performance monitoring were performed during the period of June 8 through June 17, 1999. During the implementation of the treatment system, a modification to the remedy presented in the ROD was incorporated. The groundwater from the treatment system was to be treated and then discharged into the wetland; however, the Navy decided to discharge the groundwater directly into the Navy's wastewater system for treatment. This modification did not affect the protectiveness of

human health and the environment, was cost effective, and complied with all the ARARs identified in the ROD. The USEPA and FDEP subsequently concurred with the modification to the remedy for OU1.

The *Long-Term Groundwater Monitoring Plan for Phase II Remedial Action* was issued by BEI in July 1999. This plan presented the technical approach for executing the natural attenuation monitoring required by the ROD. The long-term monitoring program, included groundwater monitoring, monitored natural attenuation, and surface water sampling two times a year for years one through three, then annually until the contaminants of concern (COCs) are below performance standards. The first semi-annual sampling event was initiated in March 2000.

As specified in the final ROD for OU1, the institutional controls for OU1 are to be imposed using a Land Use Restriction Agreement (LURA). The LURA was actually completed in the form of a Memorandum of Agreement (MOA) as agreed by the USEPA, FDEP and the Navy. Attached as an appendix to the MOA is a Land Use Control Implementation Plan (LUCIP) for OU1 which provides the site description, site location, land use control objectives, land use control implementation to achieve objectives and the reference decision document.

The LUCIP specified:

- The NAS Pensacola IR Manager shall be responsible and coordinate inspections of this Site. Any discrepancies will be forwarded to NAS Pensacola Facilities Officer for correction to maintain the objectives.
- Institutional controls shall be imposed to restrict groundwater use of the surficial zone of the Sand and Gravel Aquifer within 300 feet of the site boundaries.
- No intrusive activities shall be permitted within the site boundaries without prior approval from the NAS Pensacola Environmental Office.
- The NAS Pensacola IR Manager will submit an annual review of the institutional controls and certification that the controls should remain in place or be modified to reflect changing site conditions.
- Groundwater shall be monitored downgradient of the site to ensure natural attenuation processes are effective and contaminants above State and Federal levels are not being discharged into adjacent surface waters.

- The groundwater interception system installed to capture contaminated groundwater upgradient of Wetland 3 will continue operation with the effluent being treated prior to being discharged and shall be maintained until performance standards are achieved that are acceptable to both FDEP and EPA.
- The groundwater-monitoring program will continue until a five-year review concludes that the alternative has achieved continued attainment of the performance standards and remains protective of human health and the environment.

### **2.3.3 System Operations/Operation and Maintenance**

The Navy has operated the groundwater interception system since June 1999. The O&M Manual for Groundwater Treatment and Recovery System was issued by BEI in March 2000. The primary activities associated with the O&M include the following:

- Routine weekly system checks and readings to confirm operations are within normal parameters.
- Extended system maintenance to inspect and clean all above grade and in-well system components; and check calibration of the flow transmitter.
- Semi-annual groundwater and surface water sampling, and natural attenuation monitoring.

Beginning in December 1999, the Navy has contracted with TINUS to perform the long-term groundwater monitoring for OU1. In August 2001, the contract was modified to add the O&M for the groundwater remediation system. Semi-annual sampling events have been conducted on March 2000, August 2000, May 2001, November 2001, May 2002, and October 2002. The work is being conducted as directed by the OU1 ROD, Long-Term Groundwater Monitoring Plan (LTGMP), and the O&M manual. The completed activities for long-term monitoring include the following:

- The first year of groundwater and surface water sampling (semi-annually), natural attenuation monitoring (semi-annually), and annual reporting of results.
- The second year of groundwater and surface water sampling (semi-annually), natural attenuation monitoring (semi-annually), and annual reporting of results.
- The third year of groundwater and surface water sampling (semi-annually), natural attenuation monitoring (semi-annually), and annual reporting of results.
- The first two years of quarterly inspection and maintenance of the treatment and recovery system.

As stated in the ROD for OU1 (EnSafe, 1998a) The Navy's original 1996 cost estimate for implementation of remedial action and closure of OU1 and 30 years of long-term monitoring program (risk-reduction) was \$4,542,600. The actual costs from 1999 to the present for remedial actions including O&M and monitoring at OU1 are \$461,405. The cost-to-date for the long-term monitoring program is \$166,424.08. These cost correspond to an estimated cost to completion at 30 years of \$1,880,000.00.

## **2.4 FIVE-YEAR REVIEW**

This is the first five-year review for this site.

### **2.4.1 Administrative Components**

Members of the NAS Pensacola Partnering Team were notified of the initiation of the five-year review on May 2002. The Five-Year Review was led by Gerald Walker, P.G. of TtNUS, and included other TtNUS staff. Bill Hill of SOUTHNAVFACENGCOM assisted in the review.

The review included the following components:

- Community Involvement
- Document Review
- Data Review
- Site Inspection
- Five-year Reviews Report Development and Review.

### **2.4.2 Community Involvement**

Activities to involve the community in the five-year review included a presentation during the RAB meeting on November 5, 2002. On October 8, 2002, a notice was published in the local newspaper that a five-year review was to be conducted and that comments could be sent to Mr. Greg Campbell, Remedial Project Manager, NAS Pensacola Code 22000, Building 1754 190 Radford Boulevard, Pensacola, Florida. In addition to these activities, the Community Relations Plan will be updated following the five-year review and a public information "Fact Sheet" will be published and distributed.

### **2.4.3 Document Review**

This five-year review consisted of a review of relevant documents including the RI Report, the FS, the Proposed Plan, the ROD, the Construction Completion Report, the O&M Manual for Groundwater Treatment and Recovery System, the LTGMP, and subsequent Annual Monitoring Reports. Additionally,

FDEP Groundwater Clean-up Target Levels (GCTLs) from Chapter 62-777, Florida Administrative Code (FAC) were reviewed.

#### **2.4.4 Data Review**

##### **Groundwater Monitoring**

Groundwater monitoring began in March 2000. Since monitoring began, 2 ½ years of semiannual monitoring and sampling have occurred. In accordance with the ROD and the Proposed Plan a total of 12 contaminants (benzene, chlorobenzene, vinyl chloride, nickel, naphthalene, xylene, 1,1,2,2-tetrachloroethane, aluminum, cadmium, chromium, iron, and manganese) are being monitored. During the first year of monitoring xylenes, cadmium, iron, manganese, benzene, vinyl chloride, and chlorobenzene were detected above the FDEP GCTLs; however, the concentrations were below the limit for natural attenuation. During the second year of monitoring benzene, vinyl chloride, xylene, aluminum, cadmium, iron, and manganese were detected above the FDEP GCTLs; however, the concentrations were again below the limit for natural attenuation. In general, the concentrations of the contaminants detected above the FDEP GCTLs remained constant or have slightly increased since 1993. Of additional concern is that monitoring wells closest to Bayou Grande have over time continued to have contaminant concentrations in excess of the FDEP GCTLs (TtNUS, 2001).

##### **Natural Attenuation Monitoring**

Natural attenuation monitoring also began in March 2000. According to the Annual Monitoring Reports, the success of natural attenuation of the site contaminants is questionable. The data collected at the site does not provide evidence for widespread occurrence of reductive dechlorination. However, the contaminant plume does not appear to be increasing in concentration or expanding in areal extent (TtNUS, 2001).

##### **Surface Water Monitoring**

In addition to groundwater and natural attenuation monitoring, surface water monitoring of iron concentrations has also been conducted in Wetland 3 since March 2000. During the monitoring period all reported iron concentration have exceeded FDEPs Surface Water Criteria and the NAS Pensacola facility-specific performance standard for iron in freshwater wetlands. Iron concentrations did decrease the second year of monitoring in comparison with the first year. This however, was partly attributed to the increase in the yearly precipitation for the second year. The increased precipitation may have had a dilution effect (TtNUS, 2002).

##### **Treatment System Monitoring**

The remedial system includes an anoxic limestone trench for interception of groundwater originating from the landfill area and discharging into Wetland 3. The concentrations of iron in groundwater samples

collected downgradient of the treatment system range from 3 to 33 times less than the Iron concentrations in the upgradient well samples. However, the Iron concentration detected in the downgradient well samples remains above the FDEP's GCTLs and the groundwater discharging into Wetland 3 exceeds FDEP's Surface Water Criteria and the NAS Pensacola facility-specific performance standard for Iron in freshwater wetlands (TtNUS, 2001).

#### **2.4.5 Site Inspection**

Inspections at the site were conducted on August 8, 2002 by TtNUS and NAS Pensacola personnel. The purpose of the inspections was to assess the protectiveness of the remedy, including the presence of fencing to restrict access, the condition and operation of the treatment and recovery system, the condition of the monitoring wells, and the condition of the wetlands.

The institutional controls that are in place include the restriction of groundwater use of the surficial zone of the Sand and Gravel Aquifer within 300 feet of the site, and the limiting of intrusive activities within the landfill boundary without prior approval from the NAS Pensacola Environmental Office. No new uses of groundwater were observed, and a locked entrance gate to prevent access to the site was in place. During the site inspection, it was noted that an access road to the Barrancas National Cemetery Addition was being constructed within the site boundaries. The NAS Pensacola Environmental Office was aware of this activity. The site inspection also revealed that 55-gallon drums of CERCLA Investigation-derived waste are being stored at the site.

#### **2.4.6 ARAR Level Changes**

The following standards were identified as chemical-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- RCRA Maximum Concentration Limits (MCLs) [40 Code of Federal Regulations (CFR) 264 Subpart F]
- Safe Drinking Water Act MCLs (40 CFR 141.11 – 141.16)
- Safe Drinking Water Act MCLGs (40 CFR 141.50 – 141.51)
- Florida Water Quality Standards, FAC, Chapter 62-3
- Florida Surface Water Standards, FAC, Chapter 62-301 and –302
- Florida Drinking Water Standards, FAC, Chapter 62-550

The Florida Water Quality Standards, FAC, Chapter 62-3, was repealed in January 2000. The trigger action levels for contingent action at OU1 are the Florida surface water standards for Class III freshwater and the Florida drinking water standards. The trigger action concentrations have remained unchanged for all COCs.

There is an additional ARAR from the promulgation of the FDEP regulations (FAC, Chapter 62-777). This new rule is applicable and may be relevant and appropriate. The new CTLs rely upon health-based risk assessments. This new ARAR will not affect the protectiveness for groundwater because the new clean-up target levels default to Florida MCLs 62-550 and are the same as the established MCLs for OU1. The only change is for naphthalene; however, the established criterion for naphthalene is less than the criterion established in FAC, 62-777. Surface water criteria are presented in FAC, 62-777 for many constituents without quantitative values in FAC, 62-302. The following compounds have surface water criteria listed in FAC, 62-777:

trans-1,2-dichloroethene	11,000 micrograms per liter (µg/L) (Toxicity Criteria)
1,2-dichloroethane	5 µg/L (Human Health)
1,4-dichlorobenzene	100 µg/L (Toxicity Criteria)
chlorobenzene	17 µg/L (Toxicity Criteria)

Where:

The toxicity criteria are 1/20 of the applicable LC50 data.

None of these compounds were detected in the Wetland 3 surface water.

The only location-specific ARAR for OU1 is Executive Order 11990, Wetlands Protection Policy, which has remained unchanged.

The following standards were identified as action-specific ARARs for OU1, governing actions such as the construction of landfills:

- RCRA Groundwater Monitoring Requirements (40 CFR 264 Subpart F)
- Clean Water Act Discharge Limitations National Pollutant Discharge Elimination System (NPDES) Permit (40 CFR 122, 125, 129, 135)
- Pretreatment Standards (40 CFR 403.5)
- Safe Drinking Water Act Underground Injection Control Program (40 CFR 144)
- Florida Rules on Permits, FAC, Chapter 62-4
- Florida Underground Injection Control Regulations, FAC, Chapter 62-28
- RCRA Solid Waste Groundwater Monitoring Requirements

These standards have remained unchanged. These requirements are called for by the RCRA.



## 2.5 TECHNICAL ASSESSMENT

The following conclusions support the determination that the remedy at OU1 is expected to be protective of human health and the environment.

### *Question A: Is the remedy functioning as intended by the decision documents?*

- **Remedial Action Performance:** The groundwater treatment and recovery system appears to be constructed and operating as designed. However, groundwater and surface water monitoring downgradient of the system indicates continued exceedances of regulatory limits. Although the iron concentrations in groundwater are being decreased over time, the system is not currently meeting or expected to meet in the future, the reductions necessary for cleanup.

Groundwater monitoring at the site is being conducted at the site as designed in the ROD and Proposed Plan. The semi-annual monitoring indicates continued exceedances of regulatory standards and that plume area concentrations have remained constant or have slightly increased since 1993. In addition, monitoring wells closest to Bayou Grande representing the "point of compliance", have over time continued to have contaminant concentrations in excess of the Florida GCTLs.

- **System Operations/O&M:** The groundwater treatment and recovery system is operating and functioning at its designed specifications. Current O&M activities have been reduced from weekly onsite system visits and monthly sampling events to weekly telephone monitoring and semiannual sampling events. The reduced frequency is not expected to affect system performance. Several problems have occurred with the telemetry system, but these problems have been addressed and solved. O&M of the system has occurred at regular intervals and maintains the treatment system at its designed specifications.

Groundwater monitoring is being conducted at the intervals proposed in the ROD and Proposed Plan. The sampling interval is scheduled to decrease next year from semi-annual sampling to annual sampling. However, a reduction in contaminant concentration to justify this decrease is not evident. In addition, although the samples are being analyzed for compounds specified in the ROD and Proposed Plan, natural attenuation cannot be fully evaluated without additional analysis for natural attenuation daughter products.

- **Cost of System Operations/O&M:** System operations and O&M cost-to-date from 1999 to the present for the groundwater recovery and treatment system is \$4,779.00. This cost is included in the total cost-to-date presented in Section 2.3.3.

- **Opportunities for Optimization:** The groundwater recovery and treatment system is designed to pump 20 gallons per minute of groundwater. Because the iron concentrations detected downgradient of the treatment system remain above the CTLs, it may be necessary to investigate the possibility of increasing the capacity of the treatment system to handle a larger volume of groundwater. Therefore, resulting in more groundwater being treated over time.

The groundwater monitoring program currently has a limited list of analysis being performed. By increasing the analysis list to include natural attenuation daughter products, a complete analysis of the natural attenuation processes at the site could be completed.

- **Early Indicators of Potential Remedy Failure:** Although the iron concentrations downgradient of the groundwater recovery and treatment system are lower than the concentrations upgradient of the treatment system, the downgradient concentrations are still above the CTLs. It is possible that the system will not be able to reduce iron concentrations to an acceptable level. It is also possible that differences in seasonal precipitation may be influencing the iron concentrations.

Although the organic contaminants are not increasing in areal extent or overall concentration, the overall concentration does not appear to be decreasing. At the same time, vinyl chloride concentrations may be increasing. Natural attenuation is generally an acceptable remedy if it is believed that concentration levels will decrease below CTLs resulting in an NFA within five years. Two years have now passed, but it does not appear likely that the concentrations will decrease below CTLs within the next three years.

- **Implementation of Institutional Controls and Other Measures:** The MOA was completed on August 31, 1999, and has been approved and authorized by the responsible parties including USEPA, FDEP, and the Navy. The LUCIP was included as an appendix. OU1 is reported to have been inspected semiannually to insure the controls remain in place; however, an annual review report has not been completed. The gate and signs on site are maintained and in good condition. No water supply wells are within the restricted area. It should be noted that a portion of the site is being converted to an access road for the Barrancas National Cemetery Addition. However, this land use change does not compromise the institutional controls for the site. The NAS Pensacola Environmental Office is aware of these activities, however a MOA Annual Review Report detailing the change in land use and requesting the institutional controls be modified to reflect the changing site conditions is not available. The change in land use is not believed to affect groundwater use.

***Question B: Are the assumptions used at the time of remedy selection still valid?***

- ***Changes to Standards To Be Considered:*** This five-year review identified State CTLs that had been promulgated since the ROD was signed. The new CTLs do not affect the protectiveness of the remedy because the new CTLs defer to the MCLs listed in FAC, 62-550.
- ***Changes in Exposure Pathways:*** Although future land use of specific areas of the site will be changing, no changes in the site conditions that affect exposure pathways were identified as part of the five-year review.
- ***Changes in Toxicity and Other Contaminant Characteristics:*** Toxicity and other factors for contaminants of concern have not changed.
- ***Changes in Risk Assessment Methodologies:*** Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

***Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***

No other information that could call into question the protectiveness of the remedy has been discovered.

**2.6 ISSUES**

Deficiencies were discovered during the five-year review and are noted in Table 2-3. These issues may affect the protectiveness of the remedy if corrective actions are not taken.

<b>TABLE 2-3</b> <b>OU1 Deficiencies</b>  Five-Year Review Naval Air Station Pensacola Pensacola, Florida	
<b>Deficiencies</b>	<b>Currently Affects Protectiveness (Y/N)</b>
1. Treatment system is not being sampled at the prescribed monthly interval.	N
2. Treatment System - Iron concentrations detected in the groundwater and surface water samples remain above the CTLs	Y
3. Natural Attenuation - Concentrations of other COCs do not appear to be decreasing due to natural attenuation.	Y
4. IDW drums are being stored at the site.	Y

## 2.7 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendations and follow-up actions are outlined in Table 2-4.

<b>TABLE 2-4</b> <b>OU1 Recommendations and Required Actions</b>  Five-Year Review Naval Air Station Pensacola Pensacola, Florida				
<b>Deficiencies</b>	<b>Recommendations/ Follow-up Actions</b>	<b>Party Responsible</b>	<b>Milestone Date</b>	<b>Follow-up Actions: Affect Protectiveness (Y/N)</b>
Treatment System	Evaluate system optimization and additional remedial options	Navy		Y
Natural Attenuation	Investigate natural attenuation augmentation and additional remedial options	Navy		Y
Approval of intrusive activities	Document the approval of the intrusive activities	Navy		Y
Stored IDW Drums	Remove stored drums from the site.	Navy		Y

## **2.8 PROTECTIVENESS STATEMENT**

The groundwater recovery and treatment system remedy is currently not protective of human health and the environment with respect to Florida GCTLs and facility-specific standards. Iron concentrations have always exceeded the regulatory standards and NAS Pensacola facility-specific performance standard for iron in freshwater wetlands and there is no indication that the concentrations are decreasing over time.

The groundwater natural attenuation remedy is not protective of the human health and the environment. Contaminant concentrations have not decreased over time and vinyl chloride detected in groundwater samples adjacent the Bayou Grande may be flowing off facility.

### 3.0 OPERABLE UNIT 10, SITES 32, 33, AND 35 – IWTP SLUDGE DRYING BEDS, WWTP PONDS, AND IWTP SWMUS

Implementation of the remedial actions at OU10 began in 1997. This five-year review consists of an approximate five-year period of data and provides a status update for OU10. This statutory review is required by regulation because wastes are still contained on site and do not allow for unlimited use and unrestricted exposure.

#### 3.1 SITE CHRONOLOGY

A list of important OU10 historical events and relevant dates in the site chronology is shown in Table 3-1.

<b>TABLE 3-1</b> <b>OU10 Site Chronology</b>  <b>Five-Year Review</b> <b>Naval Air Station Pensacola</b> <b>Pensacola, Florida</b>	
<b>Event</b>	<b>Date</b>
Wastewater treated on Magazine Point	1941 - present
Facility upgraded to treat both industrial and domestic wastewater separately	1971
Domestic sludge generated at the IWTP determined to be hazardous	1978
IWTP surge pond designated as a hazardous waste surface impoundment	1981
Industrial Sludge Drying Beds (ISDBs) removed from service	1984
RCRA detection monitoring identifies groundwater contamination caused by the surge pond	1984
Monitoring program implemented to determine the extent of contamination	1984
Temporary RCRA operation permit for the surge pond is issued	1985
RCRA Corrective Action Program implemented at the IWTP	1986
Groundwater recovery system is designed and installed to remediate groundwater	1986
Groundwater recovery system placed into operation	February 1987
RCRA permit issued to operate the surge pond. Permit stipulates the continued operation of the corrective action system and the implementation of two quarterly groundwater monitoring programs	September 1987
Closure permit issued for the polishing pond, stabilization pond, and ISDBs	January 1988
Liquids and sludge removed. Clay liner and soil are sampled.	January 1988
Clean closure issued for the impoundments	1998

TABLE 3-1 (cont.) OU10 Site Chronology	
Event	Date
Closure permit for the surge pond issued	November 1988
Surge pond and ISDBs capped	1989
Monitoring requirement for each program changed from quarterly to semiannually	1991
IWTP investigation shifted from RCRA to CERCLA	1992
RI conducted	December 1992 - October 1995
Removal action performed on the Imhoff tank	1994 - 1995
100% Design Documents Leachability Study issued	February 14, 1997
Remedial Design issued	May 16, 1997
ROD issued	June 17, 1997
Remedial Action begun (trigger date)	November 3, 1997
Remedial Action Completion Report issued	February 1998
Memorandum of Agreement for Land Use Controls issued	March 31, 1999
Corrective Action Plan (CAP) issued	July 28, 2000
Renewal Postclosure Permit	January 16, 2002
RCRA Transfer Agreement Letter was submitted to USEPA & FDEP by SOUTHNAVFACENGCOM (acceptance by the Regulatory agencies has not been finalized)	March 6, 2002

## 3.2 BACKGROUND

### 3.2.1 Site Description

OU10 is on Magazine Point at the NAS Pensacola as shown on Figure 1-1. Ordnance and munitions are stored there. In addition, domestic wastewater generated on station is treated on Magazine Point, which is bounded to the north and west by Bayou Grande and east by Pensacola Bay. South of Magazine Point is the former Chevalier Field, which is currently Chief of Naval Education and Training (CNET) facilities.





OU10 is comprised of three sites that are shown on Figure 3-1: the former ISDBs (Site 32); the former WWTP Ponds including the former surge pond, stabilization pond, and polishing pond (Site 33); and miscellaneous IWTP SWMUs (Site 35) which are listed below.

Industrial grit chamber	Industrial primary clarifier and oil/water separator
Industrial comminutor	Aerobic sludge digester
Industrial sludge thickener	Aeration (activated sludge) tank
Industrial sludge presses	Surge tank
Waste oil storage tanks	Sludge truck loading station
Acid storage tanks	Parallel flocculators
Sludge bed pumping station	Parallel final clarifiers
Pump dock	Chlorine contact chamber
Ancillary piping, pumps, junction boxes, etc.	

### 3.2.2 Land and Resource Use

The facility's main area is topographically higher than the surrounding areas and is dominated by fill and development. Large amounts of fill are mounded into berms 4 to 7 feet high around the closed stabilization and polishing ponds. An extensive plateau of fill 5 to 6 feet high is at the former surge pond and associated berms. Vegetation is limited to grasses within the fenced IWTP, and in several areas grass is absent, exposing a loose organic-poor sand. Marsh vegetation has colonized the closed stabilization and polishing ponds. The area south of the IWTP is a low-lying, heavily wooded swampy area. The area north of OU10 is a wooded peninsula with thick underbrush bounded on the east by Pensacola Bay and on the west by Bayou Grande (EnSafe, 1987).

Depth to groundwater ranges from 0 to 4 feet below land surface (b/s), depending on tidal influence and ground surface elevation. Most runoff does not flow from the site but infiltrates into the subsurface rapidly through the sandy surface soil; however, a channeled ditch drains water toward the south. Erosion channels in the steeply sloped berms and flanks of the three former ponds indicate surface runoff down these structures. Standing water was observed in the RCRA clean-closed, cement-lined stabilization and polishing ponds at depths of approximately 6 to 8 inches. The asphalt cap of the closed ISDBs slopes southward, resulting in a southerly surface runoff from the asphalt area toward a sump intake to the wastewater treatment system near the chemical storage area (EnSafe, 1997).

Groundwater flow generally mimics the peninsular topography (with flow to the northwest, north, northeast, east, and southeast) and discharges to Pensacola Bay and Bayou Grande. Groundwater is not currently used as a potable water source at OU10 (EnSafe, 1997).

### **3.2.3 History of Contamination**

#### **Site 32**

Contamination by organic compounds in Site 32 soil consisted primarily of dichlorobenzene isomers (predominantly 1,4-dichlorobenzene), polynuclear aromatic hydrocarbons (PAHs), cyanide, and localized pesticide and PCB concentrations. Inorganic contamination consisted of heavy metals including cadmium, chromium, and lead. Organic contaminants were concentrated primarily in the relict drainage swell area east/northeast of the former ISDBs. Secondary organic soil contamination occurred in a horizon above the water table at the southeast edge of the former ISDBs, in the domestic sludge drying beds, and near-surface soil at the northwest slope from the ISDBs. Metals concentrations were elevated in the swell (especially in the northeast portion). The spatial distribution of these contaminants suggested the sources were related to past operation of the three sludge drying units, with most environmental contamination related to the former ISDBs and their historical surface overflow drainage into the adjoining swell and potential wetlands (EnSafe, 1997).

#### **Sites 33 and 35**

Two general types of organic contamination were detected in Sites 33 and 35 soil. The most pervasive contaminants were PAHs, pesticides, and PCBs. In general, concentrations were lower in magnitude than those detected at Site 32. The irregular and poorly delineated distribution of contaminants suggested that historically documented source areas (surge pond and stabilization pond) and several potential localized sources (i.e., miscellaneous spills, leaks, and/or line breaks) might have contributed to soil contamination. The spatial distribution of the contaminants indicated impacted soil at the southeastern corner of the former surge pond and around the surge tank. In addition, the spatial distribution indicated impacted soil from an undefined source near the chlorine contact chamber (EnSafe, 1997).

A second type of soil contamination appeared restricted to the oily horizon at the water table around the area of the former waste oil underground storage tank (UST). The contaminant source was thought to be leakage from the former waste oil tank (EnSafe, 1997).

### **3.2.4 Initial Response**

RCRA detection monitoring identified groundwater contamination attributable to the surge pond. Therefore, a RCRA assessment monitoring program was implemented to determine the extent of

contamination. Based on results of the RCRA assessment monitoring program, a groundwater recovery system was designed and installed to remediate contaminated groundwater.

In September 1987, Florida Department of Environmental Regulation (FDER) issued RCRA Permit No. H017-127026 to the U.S. Navy Public Works Center (PWC) to operate the surge pond. The permit stipulated the continued operation of the corrective action system (the recovery wells) and the implementation of two quarterly groundwater monitoring programs: (1) point-of-compliance monitoring at the surge pond and (2) corrective action monitoring to determine the effectiveness of ongoing groundwater remediation. Well sets and parameters for analysis were separately defined for each monitoring program. The first quarterly groundwater sampling for corrective action and point-of-compliance programs was initiated in November 1987.

In January 1988, FDER (presently FDEP) issued closure permits to the U.S. Navy PWC for the polishing pond, stabilization pond, and the ISDBs (No. HF17-134857). Liquids removed from the impoundments were processed through the IWTP. Sludge was removed and transported to a hazardous waste disposal facility. Upon closure, the clay liner and/or subsurface soil of each impoundment were sampled and analyzed. The subsequent laboratory report indicated only low concentrations of phenol in liners or soil beneath the stabilization and polishing ponds; and hence, FDER granted clean closure status to these impoundments. Samples from the liner or soil beneath the ISDBs, however, indicated several contaminants.

A closure permit for the surge pond (No. HF17-148989) was issued in November 1988 to the U.S. Navy PWC. Upon closure, the clay liner and/or subsurface soil were sampled and analyzed. As with the ISDBs, several contaminants were identified. Consequently, both the surge pond and ISDBs were capped with low-permeability covers (clay and asphalt, respectively) as a condition of closure in 1989. A groundwater monitoring program was developed to ensure the effectiveness of the caps.

In 1992, regulatory focus of environmental investigation at the IWTP shifted from RCRA to CERCLA. A remedial investigation/feasibility study (RI/FS) work plan for OU10 was submitted to meet CERCLA requirements. (EnSafe, 1997)

### **3.2.5 Basis for Taking Action**

#### **Contaminants**

Hazardous substances that have been released at the site in each media include:

**Site 32 Soil**

benzo(a)pyrene  
dibenzo(a,h)anthracene  
benzene  
naphthalene

**Sites 33 and 35 Soil**

naphthalene  
chlorinated benzenes

**Sites 32, 33, and 35**

**Sediment**

fluoranthene  
pesticides  
PCBs  
cadmium  
chromium  
lead

**Surface Water**

non-chlorinated aromatics  
pesticides  
cadmium  
chromium  
lead

**Shallow Groundwater**

toluene  
pesticides

**Shallow Groundwater (cont.)**

chromium  
lead  
iron  
manganese  
cadmium

**Intermediate Groundwater**

tetrachloroethylene  
trichloroethene

**Intermediate Groundwater (cont.)**

vinyl chloride  
chlorobenzene  
1,2-dichlorobenzene  
1,4-dichlorobenzene  
cadmium  
chromium  
beryllium  
iron  
manganese

Risk associated with exposure to all environmental media (and combinations) was within USEPA's generally acceptable ranges for both current site workers and potential current child trespassers (EnSafe, 1997).

For an unlikely hypothetical future site resident, exposure media were shown to exceed acceptable residential goals. These media included surface soil, shallow/intermediate groundwater, and deep groundwater (EnSafe, 1997).

### 3.3 REMEDIAL ACTIONS

#### 3.3.1 Remedy Selection

The ROD for NAS Pensacola OU10 was signed on June 18, 1997. RAOs were developed as a result of data collected during the RI to aid in the development and screening of remedial alternatives to be considered for the ROD.

The purpose of the remedial action at OU10 was to reduce the risks to human health and environment associated with exposure to soil and groundwater. To meet these goals, two remedial action objectives (RAOs) were identified. Table 3-2 lists the RAOs for OU10.

<b>TABLE 3-2</b> <b>Remedial Action Objectives for OU10</b>  <b>Five-Year Review</b> <b>Naval Air Station Pensacola</b> <b>Pensacola, Florida</b>		
Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Soil	Benzo(a)pyrene and dibenzo(a,h)anthracene	Eliminate human health risk above 1E-10.
Groundwater	Chlorinated benzenes and naphthalene	Protect groundwater from contaminants leaching from the soil.

Four remedial alternatives were evaluated in the FS for OU10 to address the soil RAO. Of the four alternatives evaluated the selected remedial action for OU10 was two components of the preferred alternative and a component of Alternative 4. The major components involved:

- Leachability study on Areas B, C, and D with excavation as a contingency and groundwater treatment under RCRA.
- Excavation of Area A.

The following components constituted the remedial action for OU10 to address the groundwater RAO:

- Implementation of a groundwater remediation system.
- Groundwater monitoring will continue at sampling intervals established during the remedial design developed in the CAP for the RCRA permit modification. The groundwater monitoring program will continue until a five-year review concludes that the alternative has continuously attained the performance standards and remains protective of human health and the environment.

### **3.3.2 Remedy Implementation**

In March 1997, soil samples were collected from Areas B, C, and D. the samples were submitted to a laboratory for Synthetic Precipitation Leaching Procedure (SPLP) analysis of SVOCs and VOCs. No compounds were detected above the groundwater clean-up criteria; therefore, soil from Areas B, C, and D does not pose a threat to the groundwater. Therefore, no further action was required at Areas B, C, and D (BEI, 1998).

The remedial contractor mobilized to the site on November 3, 1997. Initial work included removal of fencing, clearing and grubbing and other site preparation activities. All site preparation activities were completed on November 5, 1997, and excavation of contaminated soils from Area A begun. Excavation of the contaminated soils was completed on November 7, 1997. Ten dump trucks transported approximately 200 cubic yards (yd<sup>3</sup>) (or approximately 230 tons) of soil to a Subtitle D landfill for disposal. Backfill of the excavation with approximately 200 yd<sup>3</sup> of clean granular fill began on November 7, 1997 and was completed on November 10, 1997. Replacement of fencing and topsoil, placement of grass seed, and demobilization occurred on November 12, 1997.

On July 28, 2000, in accordance with the ROD and RCRA permit compliance requirements, a CAP was issued detailing the methods to be used for source reduction, monitored natural attenuation, corrective action verification, and a contingency plan. Source reduction would be accomplished through in-situ chemical oxidation, or other methods, to reduce concentrations of chlorinated compounds in groundwater source areas. The current hydraulic containment system would be deactivated. Monitored natural attenuation would be conducted to remediate the remaining regulated compounds to meet ground water protection standards established in the hazardous waste permit. Corrective action verification would be accomplished by conducting groundwater monitoring in accordance with the RCRA permit compliance requirements, and including the data generated from monitored natural attenuation. Corrective action verification would determine if the groundwater treatment and natural attenuation were reducing the groundwater contaminant levels, as well as, ensuring that the contamination is not migrating off-site. Both the monitored natural attenuation and RCRA permit compliance sampling would be conducted simultaneously. Monitored natural attenuation data would be reported in an annual monitored natural attenuation report, which would be included in the respective semi-annual RCRA monitoring report. The State of Florida's RCRA Authority is administering all groundwater remedial actions at OU10. The contingency plan was developed to address the possibility of the groundwater treatment protocol and natural attenuation not effectively reducing contaminants below groundwater standards. Contingency actions would be determined based on an analysis of site specific data and evaluation of remedial alternatives, such as additional monitoring, reestablishing location of temporary point of compliance wells, containment, additional source reduction, and/or enhanced bioremediation, as well as, reactivating the hydraulic containment system.

Groundwater monitoring in accordance with the CAP and the RCRA permit began in February 2001. On March 24, 2001, Oxygen Release Compound (ORC) was injected into the groundwater to enhance biodegradation of chlorinated-benzenes. This was performed in accordance with the CAP and the RCRA permit. In accordance with the RCRA permit and the ROD, groundwater monitoring (for RCRA compliance, natural attenuation monitoring, and corrective action verification) will occur twice a year. Groundwater samples would be analyzed for VOC, SVOC, and metal contaminants, and MNA parameters as specified in the RCRA permit, CAP, and MNA Plan (USGS, 2001).

As stated in the ROD for OU10 (EnSafe, 1997) the Navy's original 1997 cost estimate for implementation of the remedial action was \$186,500. The actual costs of remedial actions (soil removal and leachability study) for OU10 were \$143,885. The cost for groundwater and natural attenuation monitoring are included in the RCRA permit compliance efforts. Therefore, no additional cost for groundwater and natural attenuation monitoring has been incurred.

### **3.4 FIVE-YEAR REVIEW**

This is the first five-year review for this site.

#### **3.4.1 Administrative Components**

Members of the NAS Pensacola Partnering Team were notified of the initiation of the five-year review on May 2002. The Five-Year Review was led by Gerald Walker, P.G. of TINUS, and included other TINUS staff. Bill Hill of SOUTHNAVFACENGCOM assisted in the review.

The review included the following components:

- Community Involvement
- Document Review
- Data Review
- Site Inspection
- Local Interviews
- Five-year reviews report development and review

#### **3.4.2 Community Involvement**

Activities to involve the community in the five-year review were initiated with a presentation at the RAB meeting on November 5, 2002. In addition on October 8, 2002, a notice was published in the Pensacola News Journal that a five-year review was to be conducted and that comments could be sent to Mr. Greg Campbell, Remedial Project Manager, NAS Pensacola Code 22000, Building 1754 190 Radford

Boulevard Pensacola, Florida. November 6, 2002. A notice will also be sent to the local newspaper informing the public when the five-year review has been completed. Finally in addition to these activities, the Community Action Plan will be updated and a public information "Fact Sheet" will be published and distributed.

#### **3.4.3 Document Review**

This five-year review consisted of a review of relevant documents including the Proposed Plan, the ROD, the Completion Report for Remediation Work, the CAP, the Post-closure RCRA permit, and subsequent semi-annual monitoring reports. Additionally, FDEP GCTLs from Chapter 62-777, FAC were reviewed.

#### **3.4.4 Data Review**

The results from the soil removal indicate that all contaminated soil was removed. This soil was replaced with clean backfill (BEI, 1998).

The results from the RCRA compliance and natural attenuation monitoring indicate that natural attenuation processes continue to prevent migration of chlorinated ethenes to Pensacola Bay. In situ oxidation of the chlorinated ethenes source area has decreased concentrations of trichloroethene in the source area. Similarly, the data shows that the natural attenuation of chlorinated benzenes prevents the contaminant migration to Pensacola Bay (USGS, 2001).

An injection of ORC to remediate an isolated "hotspot" of contamination lowered concentrations of benzene and chlorobenzenes. However, the effectiveness of the ORC decreased over time, resulting in a rebound of contaminant concentrations. This shows that the ORC is effective in treating benzene and chlorobenzene-contaminated groundwater, but that the useful life of each ORC treatment is limited (USGS, 2001).

#### **3.4.5 Site Inspection**

TtNUS personnel conducted inspections at the site on August 6, 2002. The purpose of the inspection was to assess the protectiveness of the remedy, including the presence of fencing to restrict access, the condition of the remedial caps, and the condition of the monitoring wells.

The fencing surrounding the treatment plant is in good condition, and should prevent any unauthorized access to the site. Appropriate signage is in place at the entrance to the site. The remedial cap covering the ponds appear to be in good condition with no sign of the cap's integrity being compromised. Monitoring wells were accessible, and in good condition.



No deficiencies were noted during the site inspection.

#### **3.4.6 Interviews**

Discussions with the Navy, including the Base and SOUTHNAVFACENGCOM personnel were conducted in preparation of this report. Based on these discussions, it was determined that groundwater sampling events were being conducted in accordance with the RCRA permit, and that the soil removal was conducted efficiently and quickly. According to the personnel's understanding, the remedies were effective in keeping the contamination from migrating and in decreasing the levels of contaminants.

#### **3.4.7 ARAR Level Changes**

The following standards were identified as chemical-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Ambient Water Quality Criteria (40 CFR 131)
- Identification and Listing of Hazardous Wastes (40 CFR 261)
- National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)
- National Primary Drinking Water Standards (40 CFR 141)
- MCLGs (PL No. 99-339 100 Stat. 482 (1988))
- Florida Water Quality Standards, FAC, Chapter 62-3
- Florida Surface Water Standards, FAC, Chapter 62-301 and -302
- Florida Drinking Water Standards, Monitoring and Reporting, FAC, Chapter 62-550
- Florida Ambient Air Quality Standards

There is an additional ARAR from the promulgation of the FDEP regulations (FAC, Chapter 62-777). This new rule is applicable and may be relevant and appropriate. The new CTLs rely upon health-based risk assessments. This new ARAR will not affect the protectiveness for groundwater because the new CTLs default to Florida MCLs 62-550 and are the same as the established MCLs for OU10. The established criterion for naphthalene is less than the criterion established in FAC, 62-777.

The following standards were identified as action-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Ambient Water Quality Criteria (40 CFR 131)
- Clean Water Act Discharge Limits NPDES Permit (40 CFR 122, 125, 129, 136)
- National Primary Drinking Water Standard (40 CFR 141)

- Identification & Listing of Hazardous Wastes (40 CFR 261)
- Standards Applicable to Generators of Hazardous Waste (40 CFR 262)
- Standards Applicable to Transporters of Hazardous Waste (40 CFR 263)
- Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 264)
- RCRA Land Disposal Restrictions (40 CFR 268)
- Department of Transportation Rules for the Transport of Hazardous Substances (49 CFR 107, 171-179)
- National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)
- Florida Rules on Permits, FAC, Chapter 62-4
- Florida Hazardous Substances Release Notification
- Florida Hazardous Waste Rules, FAC, Chapter 62-730

These standards have remained unchanged.

The following standards were identified as location-specific ARARs for OU10:

- Executive Order 11990 Wetlands Protection Policy
- RCRA Location Requirements (40 CFR 264.18)

These standards have remained unchanged. These requirements are called for by RCRA.

### 3.5 TECHNICAL ASSESSMENT

**Question A: Is the remedy functioning as intended by the decision documents?**

- **Remedial Action Performance:** Contaminated soil was removed from Area A of OU10 and replaced with clean backfill. Soil samples for SPLP analysis were collected from Areas B, C, and D of the site to determine if the soil was a source of groundwater contamination. Groundwater was treated with ORC to reduce concentrations of chlorinated compounds in source areas. Monitored natural attenuation of residual concentrations of regulated compounds are being conducted at the prescribed intervals. Organic contamination does not appear to be increasing in areal extent or general concentration.
- **Early Indicators of Potential Remedy Failure:** Although the ORC appears to be effective in treating benzene and chlorobenzene-contaminated groundwater, the useful life of each ORC treatment is

limited. It could not be verified that all necessary groundwater monitoring wells were being monitored as required by the RCRA permit and CAP.

**Implementation of Institutional Controls and Other Measures:** The MOA was completed on August 31, 1999, and has been approved and authorized by the responsible parties including USEPA, FDEP, and the Navy. The LUCIP is included as an appendix to the MOA.

**Question B: Are the assumptions used at the time of remedy selection still valid?**

- **Changes to Standards and To Be Considered:** This five-year review identified Florida CTLs that had been promulgated since the ROD was signed. The new CTLs do not affect the protectiveness of the remedy because the new CTLs defer to the MCLs listed in FAC, 62-550.
- **Changes in Exposure Pathways:** No changes in the site conditions or land use that affect exposure pathways were identified as part of the five-year review. Exposure to the site groundwater will still be restricted by the institutional control.
- **Changes in Toxicity and Other Contaminant Characteristics:** Toxicity and other factors for COCs have not changed.
- **Changes in Risk Assessment Methodologies:** Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

**Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

Institutional controls for groundwater use were not included in the OU10 ROD. However, a LUCIP for OU10 was developed and included in the MOA.

### **3.6 ISSUES**

Deficiencies were discovered during the five-year review and are noted in Table 3-3. These issues may affect the protectiveness of the remedy if corrective actions are not taken.

<b>TABLE 3-3</b> <b>OU10 Deficiencies</b>  <b>Five-Year Review</b> <b>Naval Air Station Pensacola</b> <b>Pensacola, Florida</b>	
<b>Deficiencies</b>	<b>Currently Affects Protectiveness (Y/N)</b>
1. ORC is an effective treatment for benzene and chlorobenzene-contaminated groundwater; however, ORC has a limited lifecycle.	N
2. It is unclear if all identified areas of site-specific groundwater contamination are being monitored in accordance with the RCRA CAP	Y

### 3.7 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendations and follow-up actions are outlined in Table 3-4.

<b>TABLE 3-4</b> <b>OU10 Recommendations and Required Actions</b>  <b>Five-Year Review</b> <b>Naval Air Station Pensacola</b> <b>Pensacola, Florida</b>				
<b>Deficiencies</b>	<b>Recommendations/ Follow-up Actions</b>	<b>Party Responsible</b>	<b>Milestone Date</b>	<b>Follow-up Actions: Affect Protectiveness (Y/N)</b>
ORC Treatment	Evaluate oxygen-delivery strategies, including periodic ORC treatment and low-volume air sparging	Navy		Y
Groundwater Monitoring	Verification and inclusion of all groundwater monitoring wells specified in the RCRA CAP should be accomplished, and coordinated with the State of Florida RCRA group	Navy		Y

### 3.8 PROTECTIVENESS STATEMENT

The ORC treatment of groundwater and monitored natural attenuation are currently protective of human health and the environment. Concentrations of VOCs are decreasing. At the same time, migration of the contaminant plumes to the Pensacola Bay is not occurring.

## **4.0 BASEWIDE CONCLUSIONS AND RECOMMENDATIONS**

The basewide conclusions and recommendations are presented below. These conclusions and recommendations are provided in the form of a basewide protectiveness statement and a summary of the requirements of the next five-year review.

### **4.1 PROTECTIVENESS STATEMENT**

Groundwater treatment and MNA are currently being implemented at OU1 and OU10. The groundwater treatment system at OU1 does not appear to be adequately reducing iron concentrations before re-entry into the adjacent wetland. At the same time, natural attenuation also does not appear to be reducing the organic contaminants present in the groundwater. At this time, the protectiveness of the OU1 remedy is not adequate. This is due to iron concentrations present in groundwater being introduced to the wetland at concentrations exceeding CTLs and the facility-specific limits. In addition, MNA (if occurring) is not widespread and has not lowered the VOCs in groundwater to concentrations below regulatory standards prior to moving off base, this too, will cause the remedy to be non-protective.

At OU10, the groundwater ORC treatment and MNA appears to be decreasing the contaminant levels; however, the ORC does appear to have a short effective life cycle. At this time, the protectiveness of the OU10 remedy is intact, but future protectiveness afforded by the remedy may not be available unless strategies to enhance the ORC treatment are developed and enacted.

This five-year review shows that the Navy is meeting the requirements of the RODs for OU1 and OU10; however, the requirements of the RODs may not be sufficient to provide a significant degree of protectiveness of human health and the environment.

### **4.2 NEXT REVIEW**

NAS Pensacola has OUs that require statutory five-year reviews. This report represents the first five-year review conducted at NAS Pensacola. The next five-year review will be required within five years of the signature date of this review. A summary of the anticipated requirements for the next five-year review is provided below.

The five-year review should include a detailed review of the status of the OU1 LTGMP and the OU10 treatment and monitoring program. All monitoring reports and LUCIP review reports should be included in the review. After five years of monitoring at OU 1, the LTGMP requires that natural attenuation fate

and transport modeling be performed to determine if the COCs in groundwater at OU1 will meet MCLs in the 30 year time frame. This assessment is scheduled for 2004, and the findings and actions based on the assessment should be included in the next review. The next review should also include any additional sites that have received a signed ROD. The review should include all remedial action documents, including any monitoring reports. Additionally, the MOA for NAS Pensacola should be reviewed to determine its applicability to the sites.

#### **4.2.1     Statutory Review**

OU1 will require a statutory review during the next five-year review for NAS Pensacola because hazardous substances, pollutants, and contaminants remain at these sites that will not allow for unlimited use or unrestricted exposure.

OU10 will not require a statutory review during the next five-year review based on the transfer to RCRA monitoring as authorized by the letter agreement dated March 6, 2002. This agreement is undertaken based on the RCRA permit.

#### **4.2.2     Reviews for Sites with RODs Published Since This Five-Year Review**

OU4 was not included in this review because the remedial action for this site was not completed. It is anticipated that the remedial actions for OU4 will be completed at the time of the next review. The next review should include OU4.

## REFERENCES

BEI (Bechtel Environmental Inc.), 1998. *Completion Report for Remediation Work Operable Unit 10 Delivery Order No. 0067 at Naval Air Station Pensacola, Florida.*

EnSafe, Inc., 1997. *Final Record of Decision Operable Unit 10, NAS Pensacola.*

EnSafe, Inc. 1998a. *Final Record of Decision, Operable Unit 1, NAS Pensacola.*

EnSafe, Inc. 1998b. *Conceptual Remedial Design at Operable Unit (OU) 1, Naval Air Station Pensacola, Florida, Rev. 1.*

SOUTHNAVFACENGCOM (Southern Division, Naval Facilities Engineering Command), 2000 *Corrective Action Plan for Solid Waste Management Unit of the Waste Water Treatment Plant at Naval Air Station Pensacola, Florida*

SOUTHNAVFACENGCOM, 2002. *RCRA Transfer Agreement Letter*

TtNUS, 2001. *Annual Groundwater Monitoring Report for Operable Unit 1.*

TtNUS, 2002. *Annual Groundwater Monitoring Report for Operable Unit 1*

United States Geological Survey (USGS), 2001. *Active Remediation and Natural Attenuation of Benzene, Chlorobenzene, and Chlorinated Ethenes at the WWTP, NAS Pensacola.*

**APPENDIX A**

**PUBLIC NOTICE**



**Notice of the U.S. Navy's Five-Year CERCLA Review for Naval Air Station (NAS) Pensacola**

As part of the Installation Restoration Program (IRP) at Naval Air Station Pensacola and in accordance with the Superfund Amendments and Reauthorization Act of 1986, the Navy is conducting the first statutory, five-year review for the station. The review will include the following three sites at NAS Pensacola:

- Operable Unit 1 - Site 1, Sanitary Landfill
- Operable Unit 4 - Site 15, Perchlorate Waste Disposal Area
- Operable Unit 10 - Sites 22, 23, 24, Industrial Waste Water Treatment Plant Sludge Drying Beds and Waste Water Treatment Plant Ponds

The purpose of the five-year review process is to determine whether the remedy selected at the site is protective of human health and the environment. During the process the above listed sites are reviewed to determine whether the remedy selected is effective. If it is determined to require modifications, such issues will be brought forth in the report that is created following the review.

This document will be maintained in the NAS Pensacola Repository located in the University of West Florida Library and the NAS Library.

Any person wishing to provide comments regarding this notice may respond in writing to:  
Mr. Greg Campbell  
Remedial Project Manager  
Naval Air Station Pensacola  
Code 22000, Building 1754  
190 Redford Blvd.  
Pensacola, Florida 32508-5000

For information about the five-year review, or any environmental cleanup activities at NAS Pensacola, please contact Mr. Campbell at (850) 462-4871 extension 103.

Legal No. 84072 TT October 6, 2002

**APPENDIX B**

**SITE INSPECTION FORMS**

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

### Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION			
Site name: <u>OVI Sanitary Landfill</u>		Date of inspection: <u>08 Aug 02</u>	
Location and Region: <u>NAS Pinecastle</u>		EPA ID:	
Agency, office, or company leading the five-year review: <u>NAVY, Southern Division</u>		Weather/temperature: <u>85° / Overcast / Humid</u>	
Remedy Included: (Check all that apply) <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treat  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other:             </div> <div> <input checked="" type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls             </div> </div>			
Attachments:      Inspection team roster attached      Site map attached			
II. INTERVIEWS (Check all that apply)			
1. O&M site manager _____			
<div style="display: flex; justify-content: space-between;"> <div>               Name _____                Title _____                Date _____             </div> <div>               Interviewed at site _____                at office _____                by phone _____                Phone no. _____                Problems, suggestions; Report attached _____             </div> </div>			
2. O&M staff _____			
<div style="display: flex; justify-content: space-between;"> <div>               Name _____                Title _____                Date _____             </div> <div>               Interviewed at site _____                at office _____                by phone _____                Phone no. _____                Problems, suggestions; Report attached _____             </div> </div>			

## III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED (Check all that apply)

1.	O&M Documents O&M manual As-built drawings Maintenance logs Remarks	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available Readily available	<input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date Up to date	N/A N/A N/A
2.	Site-Specific Health and Safety Plan Contingency plan/emergency response plan Remarks	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	N/A N/A
3.	O&M and OSHA Training Records Remarks	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
4.	Permits and Service Agreements Air discharge permit Effluent discharge Waste disposal, POTW Other permits Remarks	Readily available Readily available Readily available Readily available	Up to date Up to date Up to date Up to date	N/A N/A N/A N/A
5.	Gas Generation Records Remarks	Readily available	Up to date	N/A
6.	Settlement Measurement Records Remarks	Readily available	Up to date	N/A
7.	Groundwater Monitoring Records Remarks	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	N/A
8.	Leachate Extraction Records Remarks	Readily available	Up to date	N/A
9.	Discharge Compliance Records Air Water (effluent) Remarks	Readily available Readily available	Up to date Up to date	N/A N/A
10.	Daily Access/Security Logs Remarks	Readily available	Up to date	N/A

# C. Institutional Controls (ICs)

OSWER No. 9333.7-03B-P

1. Implementation and enforcement  
 Site conditions imply ICs not properly implemented  
 Site conditions imply ICs not being fully enforced  
 Type of monitoring (e.g., self-reporting, drive by) Drive By  
 Frequency Daily  
 Responsible party/agency ALAS Pensacola  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Reporting is up-to-date	Yes	No	N/A
Reports are verified by the lead agency	Yes	No	N/A
Specific requirements in deed or decision documents have been met	Yes	No	N/A
Violations have been reported	Yes	No	N/A
Other problems or suggestions: _____	Report attached		

2. Adequacy  
 Remarks ICs are adequate ICs are inadequate N/A

## D. General

1. Vandalism/trespassing  
 Remarks \_\_\_\_\_ Location shown on site map no vandalism evident

2. Land use changes on site N/A  
 Remarks Land use changes (being conducted on the site) (see site map for details)

3. Land use changes off site N/A  
 Remarks \_\_\_\_\_

## VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. Roads damaged  
 Remarks Vegetation needs to be cleared to provide better access to road for the trucks Location shown on site map Roads adequate N/A

8. Wet Areas/Water Damage		Wet areas/water damage not evident	
Wet areas		Location shown on site map	Areal extent _____
Ponding		Location shown on site map	Areal extent _____
Seeps		Location shown on site map	Areal extent _____
Soft subgrade		Location shown on site map	Areal extent _____
Remarks			
9. Slope Instability	Slides	Location shown on site map	No evidence of slope instability
Areal extent _____			
Remarks			
B. Benches		Applicable	N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to intercept the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1. Flow Bypass Bench		Location shown on site map	N/A or okay
Remarks			
2. Bench Breached		Location shown on site map	N/A or okay
Remarks			
3. Bench Overlapped		Location shown on site map	N/A or okay
Remarks			
C. Loaddown Channels		Applicable	N/A
(Channel lined with erosion control mat, riprap, geotext, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1. Settlement		Location shown on site map	No evidence of settlement
Areal extent _____		Depth _____	
Remarks			
2. Material Degradation		Location shown on site map	No evidence of degradation
Material type _____		Areal extent _____	
Remarks			
3. Erosion		Location shown on site map	No evidence of erosion
Areal extent _____		Depth _____	
Remarks			

<b>E. Gas Collection and Treatment</b>		Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities Flaring Good condition Remarks _____	Thermal destruction Needs Maintenance	Collection for reuse
2.	Gas Collection Wells, Manifolds and Piping Good condition Remarks _____	Needs Maintenance	
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) Good condition Remarks _____	Needs Maintenance	N/A
<b>F. Cover Drainage Layer</b>		Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected Remarks _____	Functioning	N/A
2.	Outlet Rack Inspected Remarks _____	Functioning	N/A
<b>G. Detention/Sedimentation Ponds</b>		Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation Areal extent _____ Situation not evident Remarks _____	Depth _____	N/A
2.	Erosion _____ Areal extent _____ Erosion not evident Remarks _____	Depth _____	
3.	Outlet Works Remarks _____	Functioning	N/A
4.	Deam Remarks _____	Functioning	N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES		Applicable	N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines		Applicable	N/A
1.	Pumps, Wellhead Plumbing, and Electrical Good condition Remarks: All required wells properly operating	Needs Maintenance	N/A
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances Good condition Remarks:	Needs Maintenance	
3.	Spare Parts and Equipment Remarks: <i>Good condition</i> <del>Readyly available</del>	Requires upgrade Needs to be provided <i>CEM contractor brings parts + equipment to the site.</i>	
B. Surface Water Collection Structures, Pumps, and Pipelines		Applicable	N/A
1.	Collection Structures, Pumps, and Electrical Good condition Remarks:	Needs Maintenance	
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances Good condition Remarks:	Needs Maintenance	
3.	Spare Parts and Equipment Remarks: <i>Good condition</i> <del>Readyly available</del>	Requires upgrade Needs to be provided <i>CEM contractor brings parts + equipment to the site.</i>	



**D. Monitored Natural Attenuation****1. Monitoring Wells (natural attenuation remedy)**

☒ Properly secured/locked    ☒ Functioning    ☒ Routinely sampled    ☒ Good condition  
☒ All required wells located    ☒ Needs Maintenance    ☒ N/A

Remarks

**X. OTHER REMEDIES**

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

**XI. OVERALL OBSERVATIONS****A. Implementation of the Remedy**

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminants plume, minimize infiltration and gas emission, etc.).

*A groundwater remediation system is a 2 in riser and is pumped using a submersible electric pump into a sanitary sewer manhole. The system is designed to capture 20 gpm with the least amount of drawdown at the riser.*

**B. Adequacy of O&M**

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term propriety of the remedy.

*The system is operating at its design capacity; however, the iron concentrations in the effluent water are not below the CTE. It can only be assumed that the system is not removing enough iron from the groundwater, or not enough groundwater is being treated.*

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

### Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: <u>OU10 - IWTPL &amp; WTP</u>	Date of inspection: <u>08/08/02</u>
Location and Region: <u>NAS Pensacola</u>	EPA ID:
Agency, office, or company leading the five-year review: <u>NAVY Southern Division</u>	Weather/temperature: <u>85° / Overcast / Humid</u>
Remedy Includes: (Check all that apply)	
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other: <u>excavation &amp; leachability study</u>	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
Attachments: <input type="checkbox"/> Inspection team roster attached	<input type="checkbox"/> Site map attached
II. INTERVIEWS (Check all that apply)	
1. O&M site manager _____	
Interviewed at site _____	Name _____ Title _____ Date _____
at office _____	by phone _____ Phone no. _____
Problems, suggestions; Report attached _____	
2. O&M staff _____	
Interviewed at site _____	Name _____ Title _____ Date _____
at office _____	by phone _____ Phone no. _____
Problems, suggestions; Report attached _____	

### III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	O&M Documents O&M manual As-built drawings Maintenance logs Remarks	Readily available Readily available Readily available	Up to date Up to date Up to date	N/A N/A N/A
2.	Site-Specific Health and Safety Plan Contingency plan/emergency response plan Remarks	Readily available Readily available	Up to date Up to date	N/A N/A
3.	O&M and OSHA Training Records Remarks	Readily available	Up to date	N/A
4.	Permits and Service Agreements Air discharge permit Effluent discharge Waste disposal POTW Other permits Remarks	Readily available Readily available Readily available Readily available	Up to date Up to date Up to date Up to date	N/A N/A N/A N/A
5.	Gas Generation Records Remarks	Readily available	Up to date	N/A
6.	Settlement Monument Records Remarks	Readily available	Up to date	N/A
7.	Groundwater Monitoring Records Remarks	Readily available	Up to date	N/A
8.	Leachate Extraction Records Remarks	Readily available	Up to date	N/A
9.	Discharge Compliance Records Air Water (effluent) Remarks	Readily available Readily available	Up to date Up to date	N/A N/A
10.	Daily Access/Security Logs Remarks	Readily available	Up to date	N/A

**C. Institutional Controls (ICs)**

1. Implementation and enforcement  
 Site conditions imply ICs not properly implemented  
 Site conditions imply ICs not being fully enforced

Yes  
 Yes

No  
 No

N/A  
 N/A

Type of monitoring (e.g., self-reporting, drive by) \_\_\_\_\_

Frequency \_\_\_\_\_

Responsible party/agency \_\_\_\_\_

Contact \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

Phone no. \_\_\_\_\_

Reporting is up-to-date

Reports are verified by the lead agency

Yes  
 Yes

No  
 No

N/A  
 N/A

Specific requirements in deed or decision documents have been met

Violations have been reported

Other problems or suggestions: \_\_\_\_\_

Report attached \_\_\_\_\_

Yes  
 Yes

No  
 No

N/A  
 N/A

2.

Adequacy

Remarks \_\_\_\_\_

ICs are adequate

ICs are inadequate

N/A

**D. General**

1.

Vandalism/trampling  
 Remarks \_\_\_\_\_

Location shown on site map

No vandalism evident

2.

Land use changes on site  
 Remarks \_\_\_\_\_

N/A

3.

Land use changes off site  
 Remarks \_\_\_\_\_

N/A

**VI. GENERAL SITE CONDITIONS****A. Roads**

N/A

N/A

1.

Roads damaged  
 Remarks \_\_\_\_\_

Location shown on site map

Roads adequate

N/A